

We claim:

1. A method of treating papermaking fibers comprising mixing an aqueous suspension of papermaking fibers and one or more hydrolytic enzymes capable of randomly hydrolyzing cellulose and/or hemicellulose in an amount of from about 5000 to about 200,000 ECU per kilogram of fiber, wherein the dry tensile strength of handsheets made with the treated fibers, as compared to the dry tensile strength of handsheets made with untreated fibers, is increased about 40 percent or greater without the assistance of any other supplemental additive(s) or mechanical action.
2. The method of claim 1 wherein the dry tensile strength is increased about 50 percent or greater.
3. The method of claim 1 wherein the dry tensile strength is increased about 60 percent or greater.
4. The method of claim 1 wherein the dry tensile strength is increased about 70 percent or greater.
5. The method of claim 1 wherein the dry tensile strength is increased from about 40 to about 150 percent.
6. The method of claim 1 wherein the dry tensile strength is increased from about 50 to about 140 percent.
7. The method of claim 1 wherein the dry tensile strength is increased from about 60 to about 140 percent.
8. The method of claim 1 wherein the dry tensile strength is increased from about 80 to about 140 percent.
9. The method of claim 1 wherein the aqueous suspension of papermaking fibers includes a surfactant.

10. The method of claim 1 wherein the hydrolytic enzyme is selected from the group consisting of cellulases, hemicellulases, *endo*-cellulases, *endo*-hemicellulases, carboxymethylcellulases and *endo*-glucanases.
11. The method of claim 1 wherein the hydrolytic enzyme is selected from the group consisting of truncated cellulases, truncated hemicellulases, truncated *endo*-cellulases, truncated *endo*-hemicellulases, truncated carboxymethylcellulases and truncated *endo*-glucanases.
12. The method of claim 1 wherein the hydrolytic enzyme is a truncated *endo*-glucanase or truncated carboxymethylcellulase.
13. The method of claim 1 wherein the aqueous suspension has a consistency of from about 1 to about 16 percent.
14. The method of claim 1 wherein the aqueous suspension has a consistency of from about 8 to about 10 percent.
15. The method of claim 1 wherein the temperature of the aqueous suspension is from about 0°C to about 100°C.
16. The method of claim 1 wherein the temperature of the aqueous suspension is from about 20°C to about 70°C.
17. The method of claim 1 wherein the pH of the aqueous suspension is from about 4 to about 9.
18. The method of claim 1 wherein the pH of the aqueous suspension is from about 6 to about 8.
19. The method of claim 1 wherein the dosage of the hydrolytic enzyme is from about 10,000 to about 100,000 ECU per kilogram of oven-dried pulp.
20. The method of claim 1 wherein the dosage of the hydrolytic enzyme is from about 10,000 to about 75,000 ECU per kilogram of oven-dried pulp.

21. The method of claim 1 wherein the aqueous suspension of papermaking fibers and the hydrolytic enzyme is mixed for a time of from about 10 to about 180 minutes.
22. The method of claim 1 wherein the aqueous suspension of papermaking fibers and the hydrolytic enzyme is mixed for a time of from about 15 to about 60 minutes.
23. The method of claim 1 wherein the resulting treated fibers have a copper number of about 0.10 or more grams of copper per 100 grams of oven-dried pulp.
24. The method of claim 1 wherein the resulting treated fibers have a copper number of from about 0.10 to about 1 gram of copper per 100 grams of oven-dried pulp.
25. The method of claim 1 wherein the resulting treated fibers have a copper number of from about 0.15 to about 0.50 gram of copper per 100 grams of oven-dried pulp.
26. A method of making a paper sheet comprising:
 - (a) forming an aqueous suspension of papermaking fibers pretreated with a dosage of a hydrolytic enzyme capable of randomly hydrolyzing cellulose and/or hemicellulose, said dosage being from about 5000 to about 200,000 ECU per kilogram of oven dry fiber, wherein aldehyde groups are formed predominantly on the surface of the fibers;
 - (b) feeding the aqueous suspension into a papermaking headbox;
 - (c) depositing the aqueous suspension onto a forming fabric, whereby the fibers are retained on the surface of the forming fabric in the form of a web while water containing the hydrolytic enzyme passes through the fabric;
 - (d) collecting and recycling the water to recombine the hydrolytic enzyme with additional papermaking fibers to form an aqueous suspension; and
 - (e) drying the web to form a paper sheet.
27. The method of claim 26 wherein the dosage is from about 10,000 to about 100,000 ECU/kilogram of oven dry fiber.
28. The method of claim 26 wherein the dosage is from about 10,000 to about 75,000 ECU/kilogram of oven dry fiber.

29. The method of claim 26 wherein the dosage is from about 12,000 to about 60,000 ECU/kilogram of oven dry fiber.
30. The method of claim 26 wherein the aqueous suspension of papermaking fibers includes a surfactant.
31. The method of claim 26 wherein the hydrolytic enzyme is selected from the group consisting of cellulases, hemicellulases, *endo*-cellulases, *endo*-hemicellulases and *endo*-glucanases.
32. The method of claim 26 wherein the hydrolytic enzyme is selected from the group consisting of truncated cellulases, truncated hemicellulases, truncated *endo*-cellulases, truncated *endo*-hemicellulases and truncated *endo*-glucanases.
33. The method of claim 26 wherein the hydrolytic enzyme is a truncated *endo*-glucanase.
34. The method of claim 26 wherein the aqueous suspension has a consistency of from about 1 to about 16 percent.
35. The method of claim 26 wherein the aqueous suspension has a consistency of from about 8 to about 10 percent.
36. The method of claim 26 wherein the temperature of the aqueous suspension of papermaking fibers and hydrolytic enzyme is from about 0°C to about 100°C.
37. The method of claim 26 wherein the temperature of the aqueous suspension of papermaking fibers and hydrolytic enzyme is from about 20°C to about 70°C.
38. The method of claim 26 wherein the pH of the aqueous suspension of papermaking fibers and hydrolytic enzyme is from about 4 to about 9.
39. The method of claim 26 wherein the pH of the aqueous suspension of papermaking fibers and hydrolytic enzyme is from about 6 to about 8.

40. The method of claim 26 wherein the aqueous suspension of papermaking fibers and the hydrolytic enzyme is mixed for a time of from about 10 to about 180 minutes.
41. The method of claim 26 wherein the aqueous suspension of papermaking fibers and the hydrolytic enzyme is mixed for a time of from about 15 to about 60 minutes.
42. The method of claim 26 wherein the treated fibers from step (a) have a copper number of about 0.10 or more grams of copper per 100 grams of oven-dried pulp.
43. The method of claim 26 wherein the treated fibers from step (a) have a copper number of from about 0.10 to about 1 gram of copper per 100 grams of oven-dried pulp.
44. The method of claim 26 wherein the treated fibers from step (a) have a copper number of from about 0.15 to about 0.50 gram of copper per 100 grams of oven-dried pulp.